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A Field Guide for Identification and Interpretation of the Coastal Western Hemlock Zone, Northern Drier Maritime Subzone (CWHf), in the Prince Rupert Forest Region

by
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1 INTRODUCTION

This guide contains information, condensed for field use, on the identification and interpretation of biogeoclimatic and ecosystematic units in the Coastal Western Hemlock Zone, Northern Drier Maritime Subzone (CWHf)[1]. The area covered is shown in Figure 1 and includes most of the low and middle elevation forests of the central part of the Kalum Timber Supply Area and some of the middle elevations of the westernmost Kispiox Timber Supply Area.

It is assumed that the user of this guide has completed the training programs of the regional ecology staff so that the basic concepts and methods of site, soil, and vegetation evaluation have been mastered. Consequently the field guide does not include material on plant identification, hand texturing, or identification of soil subgroups and humus forms. To identify questionable or unknown plants, consult "A Guide to Some Common Plants of the Skeena Area, British Columbia" (Coupé et al. 1982). Refer to "A Guide to the Coastal Western Hemlock Zone, Northern Drier Maritime Subzone (CWHf), in the Prince Rupert Forest Region, British Columbia" (Haeussler et al. 1984) for further information on the principles, philosophy, and methods underpinning the classification, and on the physiography, geology, terrain, and climate of the CWHf; or for more detailed information on the classification and management interpretations of the ecosystems of the CWHf subzone. See Coates and Haeussler (1984) for a guide to mechanical site preparation and Klinka et al. (1981) for a classification of humus forms. Soil family particle size classes are used in the guide instead of texture classes. For a description of soil family particle size classes see Canada Soil Survey Committee (1978, pp. 115-118).

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[1]The CWHf has recently been relegated to variant status, as part of the Snowy Central Submaritime Variant of the Wetter CWH Subzone (i.e., the CWHw9)

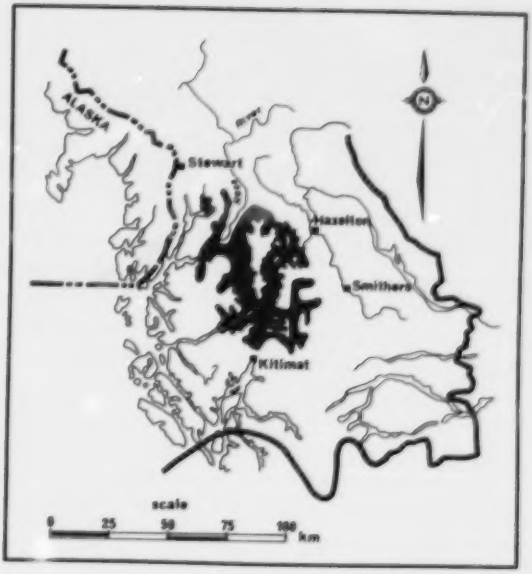


FIGURE 1. The Coastal Western Hemlock Zone, Northern Drier Maritime Subzone (CWHf), in the Prince Rupert Forest Region (approximate extent and boundaries).

2 USE OF THE GUIDE

The B.C. Ministry of Forests and Lands classification of ecosystems is arranged into a hierarchy that may be thought of as having two primary levels: biogeoclimatic and ecosystematic. Biogeoclimatic categories include the zone, subzone, variant, and phase; ecosystematic categories include the association, variation, and phase. A standard code is used to denote these categories, for example:

In addition, connotative common names are generally applied to the various categories; for example, the "Outwash Pine variation of the Dry Hemlock - Moss ecosystem association".

Using the guide involves two main steps: first, identifying the biogeoclimatic subzone or variant; and second, identifying the ecosystem association, variation, and phase where defined.

2.1 Identifying Subzones and Variants

A map of the CWH and a table presenting diagnostic floristic elements of the CWH and neighbouring biogeoclimatic units are presented in Section 2 as aids to identifying the subzone. Maps at a scale of 1:500 000 are included in Hamuesler et al. (1984); 1:250 000 maps are on file in the Prince Rupert Forest Region Office in Smithers. For the Terrace - Kitimat area, Figures 2 and 3 will also be helpful for subzone identification.

To determine the variant, the user should refer to Figure 4 (p. 13) and Figure 9 (p. 46). Table 2 (p. 10) provides a summary of vegetation and environmental characteristics for biogeoclimatic units of the CWHf. If identification of the variant is difficult, the user should identify the ecosystem units in the area and then decide which variant they best "fit".

2.2 Identifying Ecosystem Units

Sections 4 and 5 present information for the CWHf1 and CWHf2, respectively, of the Prince Rupert Forest Region. These sections include information needed to identify the various ecosystem associations, variations, and phases of the two CWHf variants. Information on recommended ecosystem-specific silvicultural practices for each of these units is also included.

The following steps are suggested to identify the ecosystem unit:

Step 1

Consult a biogeoclimatic map and Tables 1 (p. 7) and 2 (p. 10) to determine the variant in which the site occurs.

Step 2

Walk the area in question and note the site and soil factors needed to assess moisture and nutrient regimes. Watch for pronounced differences in topography, wetness, or vegetation that would indicate that more than one ecosystem unit may be present. For each relatively uniform area determine the moisture and nutrient regime so as to place the site on the edatopic grid. Consider the following factors: landscape position, slope, and aspect; soil texture and coarse fragments; humus form and thickness of organic matter; depth

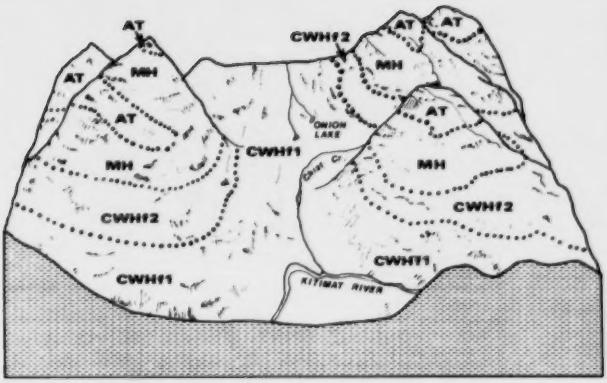


FIGURE 2. Oblique view from the Kitimat River valley looking northward.

FIGURE 3. Change in abundance of selected plant species in zonal ecosystems at low elevations between Terrace and Kitimat.

TABLE 1. Distinguishing floristic features of the CWHf and neighbouring biogeoclimatic units

Key: **** widespread and dominant *** widespread ** common * uncommon + rare - absent	CWHf Coastal Western Hemlock Zone, Northern Drier Maritime Subzone	CWHl Coastal Western Hemlock Zone, Central Wetter Maritime Subzone (west of CWHf)	ICHg Interior Cedar - Hemlock Zone, Northwestern Transitional Subzone (east of CWHf)	MH/ESSF Subalpine Mountain Hemlock and Engelmann Spruce - Subalpine Fir Zones (high elevations above CWHf)
Major climax tree species:				
western hemlock	****	****	****	**
western redcedar	***	***	*** (southern sections only)	+
amabilis fir	***	***	* (higher elevations/ western sections)	**
yellow-cedar	-	**	-	-
subalpine fir	*	-	***	***(*)
mountain hemlock	+	* (frequently in bogs)	+	***(*)
Spruce hybridization	dominantly Sitka (Picea sitchensis x glauca [Roche spruce] or P. sitchensis)**(*)	pure Sitka spruce (Picea sitchensis) **(*)	interior and Sitka characteristics (Picea glauca x sitchensis x engelmannii) **	variable, dominantly Sitka? (Picea sitchensis x glauca? x engelmannii)*
Seral tree species				
red alder	**	***	-	+
black cottonwood	**	** (floodplains only)	**	+
lodgepole pine	** (mainly low elevation)	*	***	*
trembling aspen	* (mainly low elevation)	*	*** (especially southern sections)	-
paper birch	* (mainly low elevation)	*	*** (especially southern sections)	-
Other tree species				
shore pine (Pinus contorta var. contorta)	-	**	-	-
western yew (Taxus brevifolia)	-	*	-	-

TABLE 1. (Continued)

Key: **** widespread and dominant *** widespread ** common * uncommon + rare - absent	CWHf Coastal Western Hemlock Zone, Northern Drier Maritime Subzone	CWHi Coastal Western Hemlock Zone, Central Wetter Maritime Subzone (west of CWHf)	ICHg Interior Cedar - Hemlock Zone, Northwestern Transitional Subzone (east of CWHf)	MH/ESSF Subalpine Mountain Hemlock and Engelmann Spruce - Subalpine Fir Zones (high elevations above CWHf)
Other tree species				
black spruce (Picea mariana)	-	-	* (southern sections only)	-
Rocky Mountain juniper (Juniperus scopulorum)	-	-	+ (southern sections only)	-
Climax shrub and herb species				
salal (Gaultheria shallon)	-	+	-	-
deer fern (Blechnum spicant)	+	***	-	-
sword fern (Polystichum munitum)	-	+	-	-
maidenhair fern (Adiantum pedatum)	-	+	-	-
three-leaved goldthread (Coptis trifolia)	+	**	-	-
false lily-of-the-valley (Maianthemum dilatatum)	+	**	-	-
salmonberry (Rubus spectabilis)	***	***	* (northern and western sections only)	-
skunk cabbage (Lysichiton americanum)	***	***	* (northern and western sections only)	-
red huckleberry (Vaccinium parvifolium)	***	***	+	+
Alaskan blueberry (V. alaskaense)	****	****	* (northern and western sections only)	***
black huckleberry (V. membranaceum)	**	+	***(+)	***
Sitka valerian (Valeriana sitchensis)	+	+	+	***
Indian hellebore (Veratrum viride)	+	+	+	***
Sitka burnet (Sanguisorba canadensis)	+	+	+	***
pink mountain-heather (Phyllodoce empetriformis)	+	+	+	***
white mountain-heather (Cassiope mertensiana)	+	+	+	***
partridgefoot (Luetkea pectinata)	+	+	+	***

TABLE 1. (Concluded)

Key: **** widespread and dominant *** widespread ** common * uncommon + rare - absent	CWHf Coastal Western Hemlock Zone, Northern Drier Maritime Subzone	CWHi Coastal Western Hemlock Zone, Central Wetter Maritime Subzone (west of CWHf)	ICHg Interior Cedar - Hemlock Zone, Northwestern Transitional Subzone (east of CWHf)	MH/ESSF Subalpine Mountain Hemlock and Engelmann Spruce - Subalpine Fir Zones (high elevations above CWH)
Seral shrub and herb species				
stink currant (Ribes bracteosum)	+	***	-	+
Woodsia rose (Rosa WOODSII)	***	**	+	-
goat's-beard (Aruncus dioicus)	**	**	+	**
Pacific crab apple (Malus fusca)	+(*)	-	+	-
hazelnut (Corylus cornuta)	-	-	*** (southern sections only)	-
prickly rose (Rosa acicularis)	+	+	*** (especially southern sections)	+
soopolallie (Shepherdia canadensis)	+	+	*** (especially southern sections)	-
purple peavine (Lathyrus nevadensis)	+	+	*** (especially southern sections)	-
trailing raspberry (Rubus pubescens)	+	+	*** (especially southern sections)	-
rice grasses (Oryzopsis asperifolia, O. pungens)	+	+	*** (especially southern sections)	-
Mosses and liverworts				
Stokesiella oregana	+	***	-	-
Plagiothecium undulatum	+	***	-	-
Isothecium spiculiferum	+	***	+	- +(*)
Rhytidiadelphus loreus	****	****	+	**
Rhytidiadelphus triquetrus	***	***	+(*)	+(*)
Pleurozium schreberi	**	***	+	-
Scapania bolanderi	**	*	***(*)	*
Rhytidiadelphus triquetrus	+	+	***	*
Peltigera spp.	****	****	****	**
Mylocomium splendens	*	*	**	***
Barbilophozia spp.				

TABLE 2. A summary of the biogeoclimatic units of the CWHf

Characteristic	CWHf1 Low Elevation Variant	CWHf1a Dahl-Wedeene Phase	CWHf2 High Elevation Variant
Geographic distribution	Skeena R. (Legate Ck. to Exstew); Nass R. (lava beds to Greenville); Kitsumkalum, middle Kitimat, and lower Zymoetz river valleys	Dahl and Wedeene creeks (west side of Kitimat valley)	above contiguous CWHf1; above ICHg in Skeena valley (Kitsequecla-Legate Ck.) and above Nass, Cranberry, and Kitwanga valleys east of Tseax R.; upper Zymoetz, Clore, Kitimat, Kiteen, and Kitsault river valleys
Physiographic subdivisions	primarily E slopes of Kitimat ranges of Coast Mountains	E slopes of Kitimat ranges of Coast Mountains	primarily W slopes of Nass, Bulkley, and Kispiox ranges of Hazelton mountains
Elevational range (m)	10-600	350-700	600-1000
Climate	warmer, drier than contiguous f2; greater fluctuations in temperature; snowpacks 0.5-1.5 m, moist to wet (late Nov.-Apr.); forest fires quite common	cooler with greater snowpacks than f1 but more maritime climate than f2	cooler, wetter than contiguous f1; smaller fluctuations in temperature; snowpacks 1.5-4 m, moist and firm (late Oct.-mid May); forest fires rare
Vegetation			
major tree species	Hw[a], Ba, Cw[b], Sxs, Bl absent	Hw, Ba, (Ss, Sxs?, Bl), Cw absent	Hw, Ba, (Bl, Sx, Hm), Cw[c] rare
seral stands	extensive in major valleys; dominated by Pl; At, Ep, Act, Dr common	rare (except scrub vegetation in avalanche tracks)	rare due to scarcity of fire; Pl, At, Ep, Act, Dr uncommon
zonal plant association	Hw - (Ba) - Vaccinium alaskaense - V. ovalifolium - V. parvifolium - Rhytidiadelphus loreus; Streptopus streptopoides generally absent	Hw - Ba - Vaccinium alaskaense - V. ovalifolium - (Blechnum spicant) - Rhytidiopsis robusta - Rhytidiadelphus loreus; Streptopus streptopoides sometimes present	Hw - Ba - (Vaccinium alaskaense - V. ovalifolium - V. membranaceum) - Hylocomium splendens - Rhytidiopsis robusta; Streptopus streptopoides very common
Landforms	valley bottoms: fluvial terraces and floodplains. Middle to upper elevations: glaciofluvial outwash, morainal, and colluvial deposits	similar to CWHf	middle to upper slopes: morainal and colluvial veneers and blankets
Zonal soils	sandy textured Orthic Humo-Ferric Podzols	loamy textured Orthic Humo-Ferric and Orthic Ferro-Humic Podzols	loamy textured Orthic Humo-Ferric Podzols (folisolic phases more common)
Humus depth (cm)	7-18	5-33	5-11

[a]Tree species symbols as in Appendix 1.
[b]Cw absent in upper Kitimat River valley.
[c]Present on some south aspects, Kitimat River valley.

to water table or gleying/mottling; soil depth, presence of impermeable layers, and rooting depth. Note the ecosystem indicated for this part of the edatopic grid (see Figures 5 [p. 15] and 10 [p. 48]); then refer to Tables 3 (p. 24) and 6 (p. 53) and consult Figures 6 (p. 18), 7 (p. 19), and 11 (p. 50). (Steps 3 through 6 apply to each relatively homogeneous area identified in Steps 1 and 2.)

Step 3

List the plant species and note their abundance.

Step 4

Use the information of Steps 1, 2, and 3 to work through the ecosystem key for the variant. Proceed to the description of the indicated ecosystem association. If this association encompasses the moisture and nutrient regimes indicated by Step 2, proceed to Step 5; if not, recheck your observations and try to get agreement. Reference to Figures 8 (p. 22) or 12 (p. 52), which depict the relative prominence of species in the various ecosystems, may be helpful at this point.

Step 5

Compare the site, soil, and vegetation with that summarized for the indicated ecosystem association (variation and/or phase if defined). If there is reasonable fit, proceed to Step 6; if not, record all pertinent data and discuss the information with regional ecology staff.

Step 6

Consider the management interpretations suggested for the ecosystem unit. These are located on the pages following the ecosystem descriptions. Modify them as necessary to suit site-specific and stand-specific conditions.

3 BIOGEOCLIMATIC UNITS

The CWHf occurs in inland valleys and on eastern slopes of the Coast Mountains, Kitimat Ranges, and on adjacent slopes of the Hazelton Mountains. Major valley systems include the Skeena River between Exstew River and Legate Creek, the Nass River between Greenville and Kwinatahl River, and the Zymoetz, Kitsumkalum, Kitsault, and upper Kitimat valleys. Above the main valley floors, a mid-elevation band of CWHf extends as far east as the Cranberry and Kitsequecla river drainages and high elevation stands are found in the upper Clore River and Telkwa Pass areas.

To the west, the CWHf is bounded by the Central Wetter Maritime Subzone (CWHi), and to the east it borders on the Interior Cedar - Hemlock Zone, Northwestern Transitional Subzone (ICHg). At subalpine elevations above the CWHf lie transitional subzones of the Mountain Hemlock (MH) and Engelmann Spruce - Subalpine Fir (ESSF) zones.

The location and approximate extent and boundaries of the CWHf are shown in Figure 1. Table 1 compares vegetation characteristics of the CWHf with other adjacent biogeoclimatic units and Figure 2 depicts elevational relationships of zones, subzones, and variants looking northward from the Kitimat River valley.

Two biogeoclimatic variants occur: the Low Elevation CWHf1 (Figure 4) and the High Elevation CWHf2 (Figure 9). These variants are compared in Table 2. The CWHf1a, a biogeoclimatic phase of the CWHf1, has also been included for comparison. This particular phase is not widespread or extensive throughout the CWHf, but is worth noting because of some special characteristics (such as absence of western redcedar). Other unique phases may exist in the upper Kitimat River, upper Kitsumkalum, and possibly other valleys, but these have not been formally described.

4 THE CWHf1 VARIANT

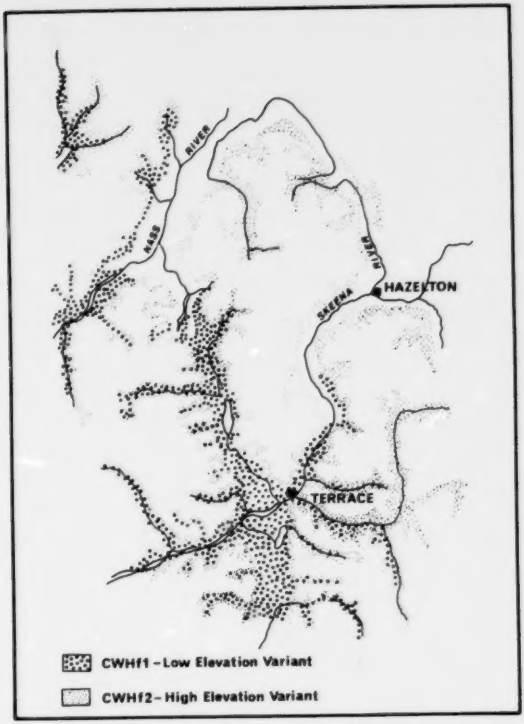


FIGURE 4. Low Elevation Variant of the Coastal Western Hemlock Zone, Northern Drier Maritime Subzone (CWHf1).

Classification of Ecosystem Units of the CWHf1:

Low Elevation Variant

CWHf1/01 Zonal Hemlock - Vaccinium - Moss ecosystem association

/01(1) Moss variation

/01(a) Glaciofluvial Gravels phase

/01(b) Imperfectly Drained phase

CWHf1/02 Dry Hemlock - Moss ecosystem assuciation

/02(1) Outwash Pine variation

CWHf1/03 Devil's Club - Oak Fern ecosystem association

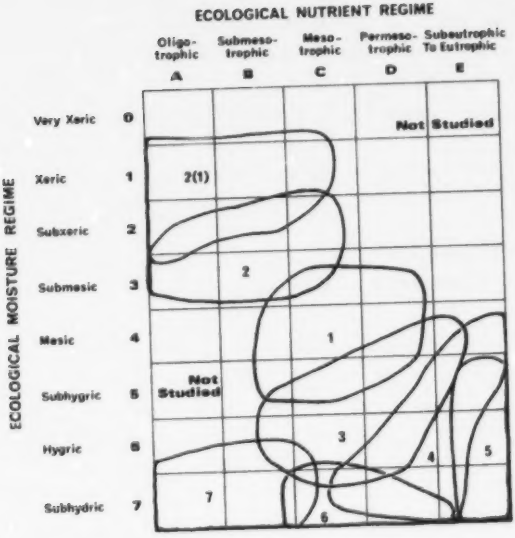
CWHf1/04 Devil's Club - Lady Fern - Oak Fern ecosystem association

CWHf1/05 Fluvial Spruce - Devil's Club - Fern ecosystem association

/05(1) Floodplain Cottonwood variation

CWHf1/06 Skunk Cabbage ecosystem association

CWHf1/07 Bog ecosystems



1 Zonal Hemlock - Vaccinium - Moss
2 Dry Hemlock - Moss
2(1) Outwash Pine variation
3 Devil's Club - Oak Fern
4 Devil's Club - Lady Fern - Oak Fern
5 Fluvial Spruce - Devil's Club - Fern
6 Skunk Cabbage
7 Bog ecosystems

FIGURE 5. Edatopic grid of ecological moisture and nutrient regimes - CWHfl.

4.1 Key to Ecosystem Units of the CWHf1

A. Ecosystems with poor tree growth, either dry or very wet ..... B

AA. Mesic to wet ecosystems with moderate to good tree growth ..... E

B. Main canopy dominated by Pl; outwash terraces, eskers, and kames (occasionally ridges or rock knobs)

DRY HEMLOCK - MOSS: OUTWASH PINE VARIATION [CWHf1/02(1)]

BB. Main canopy dominated by Hw and/or Sxs C

C. Lysichiton americanum dominates the herb layer

SKUNK CABBAGE (CWHf1/06)

CC. Lysichiton americanum rare or lacking in the herb layer .... D

D. Sphagnum spp. dominate the moss layer

BOGS (CWHf1/07)

DD. Sphagnum spp. rare or lacking in the moss layer

DRY HEMLOCK - MOSS (CWHf1/02)

E. Act dominates main canopy; floodplain islands and river bottomlands

FLUVIAL SPRUCE - DEVIL'S CLUB - FERN: FLOODPLAIN COTTONWOOD VARIATION [CWHf1/05(1)]

EE. Act rare or lacking in main canopy ..... F

F. Oplopanax horridus abundant in shrub layers ..... G

FF. Oplopanax horridus rare or lacking in shrub layers I

G. Main canopy dominated by Sxs; recent fluvial landforms

FLUVIAL SPRUCE - DEVIL'S CLUB - FERN (CWHf1/05)

GG. Main canopy usually dominated by species other than Sxs; morainal, colluvial, and occasionally inactive fluvial landforms ..... H

H. Athyrium and Dryopteris spp. rare or lacking in herb layer; moderately well-developed feathermoss carpet

DEVIL'S CLUB - OAK FERN (CWHF1/03)

HH. Herb layer dominated by ferns (Gymnocarpium, Dryopteris, and Athyrium), feathermosses confined to hummocks and decaying wood

DEVIL's CLUB - LADY FERN - OAK FERN (CWHF1/04)

I. Lysichiton americanum dominates the herb layer

SKUNK CABBAGE (CWHF1/06)

II. Lysichiton americanum rare or lacking in the herb layer ..... J

J. Shrub layers moderately to well developed, dominated by Vaccinium spp.

ZONAL HEMLOCK - VACCINIUM - MOSS (CWHF1/01)

JJ. Shrub layers very poorly developed

ZONAL HEMLOCK - VACCINIUM - MOSS: MOSS VARIATION [CWHF1/01(1)]

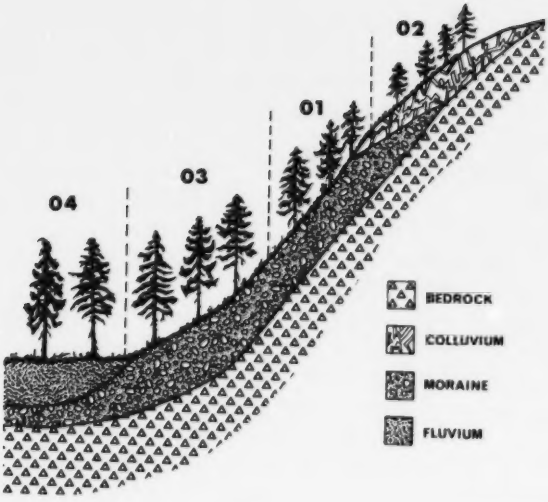


FIGURE 6. Topographic sequence of some CWHf1 ecosystem associations on a slope.

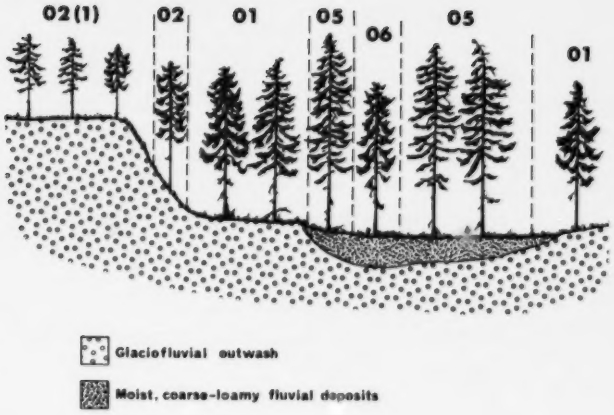


FIGURE 7. Topographic sequence of some CWHf1 ecosystem associations on a valley floor.

4.2 Prominence of the Major Species of the CWHf1

Figure 8 depicts the relative prominence of several species that typify the CWHf1. Prominence is a measure derived from both presence and plant cover. For example, if a species is present on four of five plots (i.e., presence of 80%) and has a mean cover on the five plots of 7%, its prominence would be equal to:

(square root of 80)x(7) = 63 (rounded off to nearest whole number)

Figure 8 only includes species having a prominence value of 50 or more in one or more ecosystems. To get a firm idea of this cut-off value, note that a species that always occurs would have to have a cover of 5% or more. Clearly, this would not easily be overlooked in the field.

Figure 8 presents circles whose diameters are proportional to the prominence value. The diameter equivalent to a prominence value of 50 is about 1.4 mm.

4.3 Description and Interpretation of CWHf1 Ecosystems

Table 3 presents selected physical and edaphic features associated with the ecosystem units; Table 4 (p. 25) summarizes silvicultural interpretations for these units and Table 5 (p. 45) shows equivalent ecosystems of the CWHf1, CWHf1a, and CWHf2. Pages 26 through 45 describe and interpret the various ecosystem units. The small figure that appears in the upper right of the descriptive pages is an edatopic grid with an outlined area indicating the usual moisture and nutrient conditions for the ecosystem.

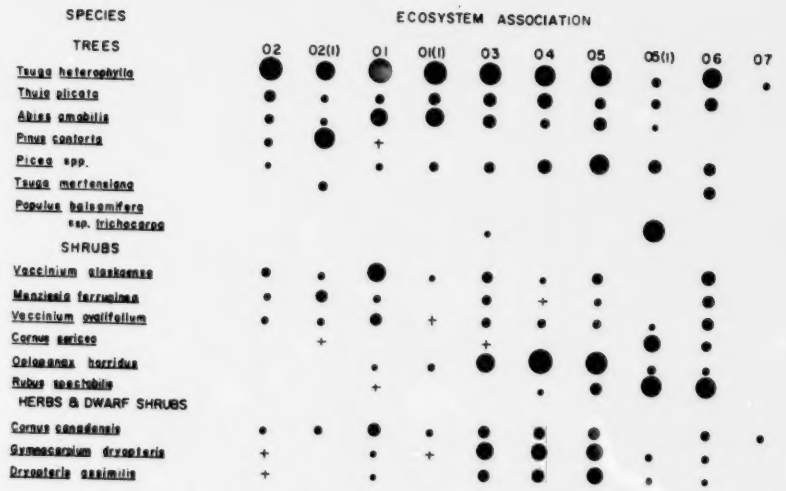


FIGURE 8. Prominence values for the major species of the CWHf1.

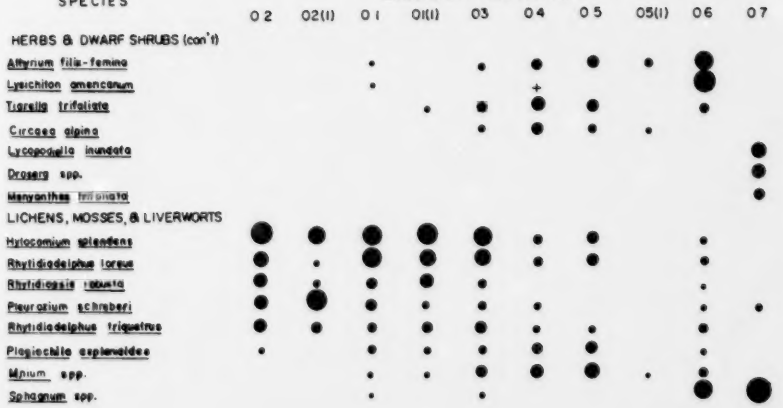


FIGURE 8. (Continued)

TABLE 3. Habitat features of ecosystem associations and phases of the Coastal Western Hemlock, Northern Drier Maritime, Low Elevation Variant (CWHf1)

Habitat features	CWHf1/01	CWHf1/01a	CWHf1/01b	CWHf1/02	CWHf1/03	CWHf1/04	CWHf1/05	CWHf1/06	CWHf1/07
Slope positions	Middle to upper	Valley floor, terraces	Valley floor, slope base	Upper to middle	Lower to middle	Toe, lower slope, bench	Valley floor	Valley floor, slope base	Valley floor, slope base
Slope range	0-70+%	Level	Level	Level to very steep	Level to very steep	Level to gentle	Level	Level	Level
Soil parent materials[a]	Mb, Cb, Mv, Cv, F	FG	Ov over F or M	Mv, Cv, FG, Mb, F	M, F, FG	M, C, F	F	Ov over L, M or F	Ob
Particle size classes[b]	S, CL, SS, LS, CLS	CLS	L, LS	S, CL, SS, LS	L, CL, S, LS, CLS, SS	L, LS	L, S, CL, SS	L, FL	n/a
Drainage class[c]	G-MG	MG	MG-I	VR-G	MG-I	I	G-I	I-VP	I-VP
Moisture regime	mesic	mesic	mesic	submesic	subhygric	hygric	subhygric	subhydric	subhydric
Nutrient regime[d]	o	m	m	sm	pm	pm-e	e	e-pm	e-sm
Soil classification[e]	HFP	HFP	HFP	HFP, DB	HFP, DB	G, MG	R, DB, EB, HFP	M, H, HG	M
Humus form classification[f]	MMR	MMR	MMR	MMR	MMR, HMR	HUMR, MMR	variable	HTMR	HTMR
Rooting depth (cm)	65	--	20-35	50	20-90	often >30	25-60+	20-30	--
Thickness, humus layer (cm)	20 (5-55)	20	30	10 (5-40)	5-11	5-15	3	30-60	60+
Mineral soil pH (mean in $CaCl_2$)	4.7	4.8	4.6	4.7	4.5	4.6	5.3	5.5	4.1
Humus pH (mean in $CaCl_2$)	2.7	--	--	3.0	4.1	4.4	5.2	4.5	3.6

[a]C = colluvial, F = fluvial, FG = glaciofluvial, L = lacustrine, M = morainal, O = organic, v = veneer (less than 1 m thick), b = blanket (greater than 1m thick); e.g.,Cv = colluvial veneer.
[b]Family particle size classes from CSSC (1978). S = sandy, L = loamy, CL = coarse-loamy, FL = fine-loamy, SS = sandy-skeletal, LS = loamy-skeletal, CLS = coarse loamy-skeletal.
[c]Drainage class from Wellesley et al. (1980). VR = very rapid, R = rapid, G = good, MG = moderately good, I = imperfect, P = poor, VP = very poor.
[d]Nutrient Regime: most common regime(s), from Haeussler et al. (1984). m = mesotrophic, sm = submesotrophic, pm = permesotrophic, e = eutrophic, o = oligotrophic.
[e]Representative Soil Great Groups/Orders (CSSC 1978). EB = L.-ric Brunisol, DB = Dystric Brunisol, HG = Humic Gleysol, G = Gleysol, GL = Gray Luvisol, M = Mesisol, H = Humisol, FMP = Ferro-Humic Podzol, HFP = Humo-Ferric Podzol, R = Regosol, HR = Humic Regosol.
[f]Representative Humus Form Group (Klinka et al. 1981). MMR = Mormoder, HUMR = Humimor, MMR = Mormoder, HTMR = Histomoder.
Note: For abbreviations of ecosystem units, see previous lists accompanying edatopic grids.

TABLE 4. Summary of silvicultural prescriptions and guidelines for the CWHf1

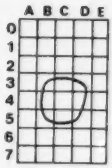
Ecosystem unit	Species choice		Primary method of establishment	Site preparation		Brush potential
	Preferred	Acceptable		Mech.	Burning	
/01 /01(a) /01(1)	Hw, Ba	Sxs[a], Pl	natural	AVOID	AVOID	low
/01(b)	Hw, Ba	Sxs[a], Cw	natural	AVOID	AVOID	low
/02 (except fluvial terraces)	Pl	minor Cw	planting	AVOID	AVOID	none
/02 (fluvial terraces) /02(1)	Pl	minor Cw, Hw	natural & planting	OK	AVOID	none
/03 (in complex)	Sxs	Hw, Ba Cw, Pl	natural	AVOID	AVOID	moderate
/03 (extensive area)	Sxs	Hw, Ba, Cw	planting	AVOID	OK	severe
/04	Sxs	Cw, (Ba, Hw)	planting	AVOID	YES	severe
/05 /05(1)	Sxs	Act, Cw Hw, (Ba)	planting	OK	OK	severe
/06	Sxs, Cw	(Hw, Ba)	natural & planting	AVOID	AVOID	variable

[a]See discussion on page 27.

ZONAL HEMLOCK - VACCINIUM - MOSS (CWHf1/01)

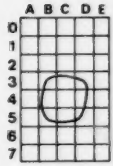
SLOPE POSITIONS: Middle to upper; less commonly on valley floors and terraces.

SLOPE RANGE: Gentle to very steep (0 - 70+%), occasionally flat.



VEGETATION LAYERS	SOILS
TREE: Hw Ba (Cw) (Sxs)	PARTICLE SIZE CLASS: Sandy, coarse-loamy, sandy-skeletal.
SHRUB: cover variable but usually moderately to well developed; advanced regeneration often abundant. Vaccinium alaskaense V. ovalifolium V. parvifolium Menziesia ferruginea	DRAINAGE: Good to moderately good. EFFECTIVE ROOTING: Usually greater than 65 cm. COARSE FRAGMENT CONTENT: Sometimes greater than 35%.
HERB: poorly to moderately well developed. Cornus canadensis Rubus pedatus Clintonia uniflora Orthilia secunda	TERRAIN/PARENT MATERIALS: Morainal and colluvial blankets and veneers; glaciofluvial terraces; sometimes fluvial deposits. SOIL NAME: Orthic Humo-Ferric Podzols.
MOSS: usually well developed. Rhytidiadelphus loreus Hylocomium splendens Rhytidiopsis robusta (Pleurozium schreberi) (Plagiochila porelloides)	HUMUS FORM: Hemimors; (Humimors, Hemihumimors).

COMMENTS: This is the zonal association for the CWHf1 and is the most widely distributed association in the variant. The moss variation of this association, CWHf1/01(1), is similar, but the shrub layer is poorly developed or consists of a dense cover of conifer regeneration (mainly Hw and Ba); Goodyera oblongifolia may be present in the herb layer; and Rhytidiopsis robusta is sometimes the dominant moss.



ZONAL HEMLOCK - VACCINIUM - MOSS:
GLACIOFLUVIAL GRAVELS PHASE [CWHf1/01(a)]
IMPERFECTLY DRAINED PHASE [CWHf1/01(b)]

SLOPE POSITIONS: Valley floor, slope bases, and terraces.

SLOPE RANGE: Level.

VEGETATION LAYERS	SOILS	
	Glaciofluvial gravels phase	Imperfectly drained phase
See CWHf1/01 and COMMENTS below.	PARTICLE SIZE CLASS: Coarse loamy-skeletal.	Loamy, loamy-skeletal.
	EFFECTIVE ROOTING: Sometimes greater than 30 cm.	20 - 40 cm (variable).
	COARSE FRAGMENT CONTENT: 35 to 85%.	Usually 0.
	TERRAIN/PARENT MATERIALS: Glaciofluvial deposits.	Organic veneers overlying morainal or fluvial deposits.
	SOIL NAME: Orthic Humo-Ferric Podzols.	Humo-Ferric Podzols; Ortstein Ferro-Humic Podzols.
	HUMUS FORM: Hemimors.	Mormoders; Hemimors.

COMMENTS: The CWHf1/01(a) is common in the Onion Lake area between Terrace and Kitimat. Many soil and site characteristics seem akin to the Dry Hemlock - Moss association. The CWHf1/01(b) occurs in the Kitimat River valley and may occur elsewhere; it is characterized by accumulations (10 - 30+ cm) of decaying wood and humus overlying imperfectly drained mineral soils. Scattered individuals of Lysichiton americanum, Athyrium filix-femina, Streptopus roseus, or other atypical species may be present. This phase is small in extent and may be found in complexes with the Skunk Cabbage association.

ZONAL HEMLOCK - VACCINIUM - MOSS (CWHf1/G1)

ACTIVITY OR CONCERN	CWHf1/01 CWHf1/01(a) CWHf1/01(1)	CWHf1/01(b)
Species choice:		
Preferred	- Hw, Ba.	- Hw, Ba.
Acceptable	- Sxs, Pl.	- Sxs, Cw.
Logging:	- winter or summer.	- snowpack logging preferred. - windfall potential. - avoid cut-block boundaries through or adjacent to stands of this phase.
	- protect acceptable advanced regeneration by minimizing disturbance. - 3-m knockdown enforced to minimize mistletoe. - steeper areas should be high-lead logged.	
Site preparation:		
Mechanical	- AVOID.	- AVOID.
Prescribed fire	- AVOID. - planting required if burned; delay planting three (3) growing seasons to improve survival.	- AVOID.
Brush hazard:	- low.	- low, unless disturbed.
Reforestation:	- use acceptable advanced Hw and Ba. - fill-plant if required with Sxs or Hw.	- low availability of planting spots if disturbed.
Other comments:	- Ba preferred only on moister and richer sites. - increase component of Sxs and Cw in the more oceanic parts of the variant. - mixed opinions exist on the use of Sitka spruce on circum-mesic sites in the CWHf1. Many ecologists maintain that it is suited only to subhygric to	

Other comments (cont'd)

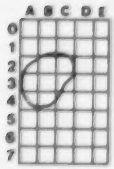
hygric soil moisture regimes and subeutrophic to eutrophic nutrient regimes. Others point out that spruce does occur, and individual trees seem to grow well in natural stands on drier, less rich sites. Spruce might be out-competed in natural stands, partly because of the build-up of very strongly acid and sometimes thick Mor humus.

- exposed mineral soil provides a suitable seedbed, favouring spruce germination. Also, the exposure probably results in a more favourable soil thermal regime. Nutrient availability might also be more favourable. These changes could improve survival and growth of spruce.
- planted Sitka spruce seems to be performing well on circum-mesic sites in the general area of Onion Lake, south of Terrace. Its performance is likely related to improved soil thermal and nutrient regimes following logging and broadcast burning. Whether or not this is a relatively short-term effect is currently a matter of debate. The plantations are in an area that is not generally representative of the CWHf1; the climate is transitional to the more maritime CWHi1. Parent materials are also somewhat unusual; gravelly glaciofluvial materials predominate. Also, cemented subsoil horizons (e.g., ortstein layers) may be common.
- in general, it would be best to restrict the use of Sitka spruce to relatively moist and rich sites in the CWHf1, at least until more conclusive information is available. It still could be planted on some circum-mesic sites when a reasonable case for its use can be made based on a site-specific evaluation.

DRY HEMLOCK - MOSS (CWHf1/02)

SLOPE POSITIONS: Upper to middle slopes, ridges, valley floors, and terraces; moisture-shedding positions.

SLOPE RANGE: Level to very steep.



VEGETATION LAYERS

SOILS

TREE: usually dense stands of small average diameter.

Hw
Pl
(Cw)

SHRUB: absent or very poorly developed.

Vaccinium spp.
Paxistima myrsinites
Menziesia ferruginea

HERB: absent or very poorly developed.

Goodyera oblongifolia
Orthilia secunda
Chimaphila umbellata
Platanthera orbiculata
Corallorhiza maculata

MOSS: well developed.

Hylocomium splendens
Rhytidiadelphus loreus
R. triquetrus
Rhytidiopsis robusta
Pleurozium schreberi

PARTICLE SIZE CLASS:
Sandy, coarse-loamy, sandy-skeletal, loamy-skeletal.

DRAINAGE:
Rapid to good.

EFFECTIVE ROOTING:
Often greater than 50 cm.

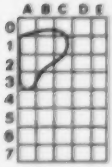
COARSE FRAGMENT CONTENT:
Commonly greater than 50%.

TERRAIN/PARENT MATERIALS:
Morainal and colluvial veneers; glaciofluvial terraces; some deep, coarse morainal and fluvial deposits.

SOIL NAME:
Orthic Humo-Ferric Podzols and Eluviated Dystric Brunisols.

HUMUS FORM:
Hemimors.

COMMENTS: Do not confuse this association with the Moss variation of the CWHf1/01. The Dry Hemlock - Moss association is widespread on valley floors and slopes throughout the CWHf1 and is especially common in areas with coarse-textured or shallow soil parent materials. It is characterized by dense, small-diameter stands (mainly Hw, often with scattered Pl) and a thick carpet of mosses. Shrubs and herbs are absent or occur as scattered individuals or patches.



DRY HEMLOCK - MOSS: OUTWASH PINE VARIATION [CWHF1/02(1)]

SLOPE POSITIONS: Valley floors, terraces, plains (sometimes ridges or rock knobs).

SLOPE RANGE: Level (0 - 5%).

VEGETATION LAYERS

TREE:
Pl (dominant cover)
Hw
(Hm)

SHRUB: sparse.
Menziesia ferruginea
Vaccinium membranaceum
V. parvifolium
(Amelanchier alnifolia)

HERB: sparse.
Linnaea borealis
Chimaphila umbellata
Vaccinium caespitosum
Cornus canadensis
Pyrola asarifolia
(Melampyrum lineare)
(Arctostaphylos uva-ursi)

MOSS: well developed.
Pleurozium schreberi
Peltigera spp.
Hylocomium splendens
Rhytidiadelphus triquetrus
(Polytrichum juniperinum)
(Dicranum polysetum)
(Cladonia spp.)
(Cladina spp.)
(Stereocaulon spp.)

SOILS

PARTICLE SIZE CLASS:
Coarse loamy-skeletal, sandy-skeletal.

DRAINAGE:
Very rapid to good.

EFFECTIVE ROOTING:
May be greater than 40 cm.

COARSE FRAGMENT CONTENT:
Commonly greater than 35%.

TERRAIN/PARENT MATERIALS:
Coarse glaciofluvial materials; also shallow morainal or colluvial materials over bedrock.

SOIL NAME:
Orthic Humo-Ferric Podzols.

HUMUS FORM:
Hemimors.

COMMENTS: Common on outwash terraces at low elevations in major valleys such as the Kitsumkalum, upper Kitimat, and Skeena. Extremely Dry Pine - Lichen ecosystems on ridges or rock outcrops may also be included within this variation. Tree height growth is poor and some botanical curiosities, such as Hemitomes congestum, may be found.

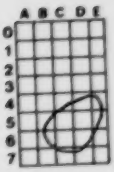
DRY HEMLOCK - MOSS (CWHf1/02)

ACTIVITY OR CONCERN	CWHf1/02 (except fluvial terraces)	CWHf1/02 (fluvial terraces) CWHf1/02(1)
Species choice:		
Preferred	- Pl; use only local provenances.	
Acceptable	- minor Hw. - minor Cw; some pole potential.	
Logging:	- AVOID EXCESSIVE GROUND DISTURBANCE.	- promote Pl regeneration. - light disturbance beneficial.
	- 3-m knockdown to eliminate shade-tolerant remnants of the understory.	
Site preparation:		
Mechanical	- AVOID, particularly on steep slopes or shallow soils.	- OK but do not scalp. - a possibility, only if winter logged.
Prescribed fire	- AVOID, unless organic horizons are thick (greater than 15 cm). - burning is acceptable if only the L horizon is consumed (spring). - if advanced regeneration is unacceptable, consider a light burn.	
Brush hazard:	- no problem, however, eliminate true firs and hemlock if required.	
Reforestation:	- plant Pl.	- plant Pl if natural seeding-in is inadequate.
Other comments:	- Ba, Hw, Sxs, generally unacceptable (Hw may be acceptable as a minor species on thick organic horizons). - organic horizons are very beneficial for moisture retention. - a minor component of aspen may be acceptable for site improvement of these dry, nutrient-impoverished ecosystems.	

DEVIL'S CLUB - OAK FERN (CWH1/03)

SLOPE POSITIONS: Lower (sometimes to middle).

SLOPE RANGE: Level to very steep but usually gently sloping.



VEGETATION LAYERS

TREE:
Hw
Cw
Ba
(Sxs)

SHRUB: moderately to well developed.
Oplopanax horridus
Ribes lacustre
Vaccinium ovalifolium
Menziesia ferruginea
(Viburnum edule)
(Sambucus racemosa)

HERB: moderately to well developed.
Gymnocarpium dryopteris
Tiarella trifoliata
T. unifoliata
Streptopus roseus
S. amplexifolius
Rubus pedatus
Clintonia uniflora
Orthilia secunda
Cornus canadensis
Actaea rubra
Dryopteris assimilis

MOSS: well developed but often hidden by shrubs and herbs.
Hylocomium splendens
Rhytidiadelphus triquetrus
R. loreus
(Plagiochila porelloides)
(Mnium spp.)

SOILS

PARTICLE SIZE CLASS:
Loamy, coarse-loamy, sandy, (including skeletal groups).

DRAINAGE:
Moderately good to imperfect.

EFFECTIVE ROOTING:
Variable (20 - 90 cm).

COARSE FRAGMENT CONTENT:
Sometimes greater than 35%.

TERRAIN/PARENT MATERIALS:
Fluvial, glaciofluvial, or morainal materials.

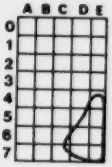
SOIL NAME:
Orthic Humo-Ferric Podzols; Eluviated Dystric Brunisols.

HUMUS FORM:
Mormoders; Hemimors.

COMMENTS: Spruce (when present) is usually the largest tree; Ba and Cw are often important stand components. This association is common through the CWH1 but usually covers smaller areas.

DEVIL'S CLUB - OAK FERN (CWHf1/03)

ACTIVITY OR CONCERN	In complex with CWHf1/01	Extensive area
Species choice:		
Preferred	- Sxs.	- Sxs.
Acceptable	- Hw, Ba, Cw, Pl.	- Hw, Ba, Cw.
Logging:	- minimize disturbance. - minimize slash accumulation. - AVOID LOGGING DURING WET SEASON. - 3-m knockdown.	- 3-m knockdown. - winter logging preferred.
Site preparation:		
Mechanical	- avoid because disturbance aggravates brush problem.	
Prescribed fire	- AVOID, especially on shallow soil.	- OK.
Brush hazard:	- moderate.	- severe. - brushing and weeding probably required.
Reforestation:	- use acceptable Hw and Ba, and if understocked PLANT IMMEDIATELY WITH Sxs.	- usually understocked and requires IMMEDIATE PLANTING.
Other comments:	- assess need for brush control at time of first survival assessment. - this unit often exists in complex with /01 as hollows that collect slash.	



DEVIL'S CLUB - LADY FERN - OAK FERN (CWHf1/04)

SLOPE POSITIONS: Valley floor, toe, lower slope, and bench.

SLOPE RANGE: Level to gently sloping (0 - 20%).

VEGETATION LAYERS

TREE: large, widely spaced trees.
- Hw
- Sxs
- Cw
- (Ba)
- (Act)
- (Dr)

SHRUB: usually dense.
- Oplopanax horridus
- Rubus spectabilis
- Vaccinium ovalifolium
- (Ribes spp.)
- (Cornus sericea)
- (Viburnum edule)
- (Lonicera involucrata)
- (Sambucus racemosa)

HERB: very well developed.
- Athyrium filix-femina
- Gymnocarpium dryopteris
- Dryopteris assimilis
- Tiarella trifoliata
- T. unifoliata
- Circaea alpina
- Viola glabella
- Streptopus roseus
- S. amplexifolius
- Galium triflorum

MOSS: sparse, mainly on hummocks.
- Mnium spp.
- (Brachythecium spp.)
- (Plagiochila porelloides)
- (Rhytidiadelphus loreus)

SOILS

PARTICLE SIZE CLASS:
Loamy, loamy-skeletal.

DRAINAGE:
Moderately good to imperfect.

EFFECTIVE ROOTING:
Sometimes greater than 30 cm.

COARSE FRAGMENT CONTENT:
Sometimes may be greater than 35%.

TERRAIN/PARENT MATERIALS:
Morainal, colluvial, and fluvial.

SOIL NAME:
Orthic Gleysols;
Orthic Humic Gleysols.

HUMUS FORM:
Hemihumimors; Mormoders.

COMMENTS: This association has a high capability for timber production. It can be distinguished from the CWHf1/03 by the abundance of salmonberry, the dominance of large ferns (lady fern and spiny wood fern), and a poorly developed moss layer dominated by leafy Mnium mosses.

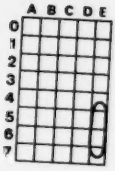
DEVIL'S CLUB - LADY FERN - OAK FERN (CWH/1/04)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sxs.
Acceptable	- Ba preferable in valleys experiencing cold air drainage. - Hw acceptable on humus mounds. - Cw; this is its best site, but its growth remains slower than that of the others.
Logging:	- try to lay out these units as separate areas to facilitate speed and control of subsequent treatments. - avoid using these ecosystems for road building and skid-trails. - winter logging preferred, or log during dry season. - minimize slash accumulation and disturbance (duration and degree).
Site preparation:	
Mechanical	- AVOID because of fine soil texture, wetness of site, and brush hazard.
Prescribed fire	- recommended, except on fragmental or skeletal soils - often difficult to get a good burn because of wetness and brush; recommend burning in very dry times of year.
Brush hazard:	- SEVERE; plan everything to minimize this problem. - assess need and urgency of control at time of planting.
Reforestation:	- PLANT IMMEDIATELY with healthy, sturdy stock.
Other comments:	- these units must be planned in detail and closely controlled to avoid brush problems and site degradation. TIMING IS CRITICAL. Winter logging followed by a spring burn will save a season. Frequent monitoring of plantation progress is necessary, followed by swift treatment of brush control if required.

FLUVIAL SPRUCE - DEVIL'S CLUB - FERN (CWHf1/05)

SLOPE POSITIONS: Valley floor.

SLOPE RANGE: Level (0 - 2%).



VEGETATION LAYERS

TREE: very large, widely spaced trees.
Ss or Sxs
Hw
Ba
Cw

SHRUB: well developed.
Oplopanax horridus
(Vaccinium alaskaense)
(Ribes spp.)
(Sambucus racemosa)
(Rubus spectabilis)

HERB: moderately well developed.
Gymnocarpium dryopteris
Athyrium filix-femina
Dryopteris assimilis
Tiarella trifoliata
T. unifoliata
Streptopus amplexifolius
S. roseus
(Circaea alpina)
(Galium triflorum)

MOSS: poorly developed.
(Mnium spp.)
(Brachythecium spp.)
(Plagiochila porelloides)
(Rhytidiadelphus loreus)
(Hylocomium splendens)

SOILS

PARTICLE SIZE CLASS:
Variable: loamy, sandy, coarse-loamy, and sandy-skeletal.

DRAINAGE:
Good to imperfect.

EFFECTIVE ROOTING:
25 - 60 cm.

COARSE FRAGMENT CONTENT:
Sometimes greater than 35%.

TERRAIN/PARENT MATERIALS:
Fluvial deposits.

SOIL NAME:
Orthic and Cumulic Regosols; Orthic Dystric and Eutric Brunisols; Orthic Humo-Ferric Podzols.

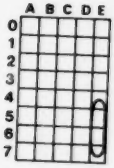
HUMUS FORM:
Velomoders; Leptomoders; on older floodplains.

COMMENTS: This association has the greatest capability for tree growth in the CWHf. Few undisturbed stands remain and most ecosystems in this association belong to the seral variation.

FLUVIAL SPRUCE - DEVIL'S CLUB - FERN:
FLOODPLAIN COTTONWOOD VARIATION [(CWHf1/05(1)]

SLOPE POSITIONS: Valley floor.

SLOPE RANGE: Level (0 - 2%).



VEGETATION LAYERS

TREE: very large, widely spaced trees.
- Act
- Ss
- Cw
- Dr

SHRUB: tall and usually dense.
- Cornus sericea
- Rubus spectabilis
- Sambucus racemosa
- Symphoricarpos albus
- Lonicera involucrata
- Rosa nutkana
- Ribes spp.
- Viburnum edule

HERB: variable development.
- Athyrium filix-femina
- Equisetum arvense
- E. pratense
- E. hyemale
- Disporum hookeri
- Galium triflorum
- Osmorhiza chilensis
- Maianthemum dilatatum
- Aralia nudicaulis
- Asarum caudatum
- Aruncus dioicus
- Viola canadensis
- Pyrola asarifolia
- Smilacina spp.

MOSS: generally absent.

SOILS

PARTICLE SIZE CLASS:
Variable: loamy, sandy, coarse-loamy, and sandy-skeletal.

DRAINAGE:
Good to imperfect.

EFFECTIVE ROOTING:
25 - 60 cm.

COARSE FRAGMENT CONTENT:
Sometimes greater than 35%.

TERRAIN/PARENT MATERIALS:
Fluvial deposits.

SOIL NAME:
Orthic and Cumulic Regosols;
Orthic Dystric and Eutric Brunisols;
Orthic Humo-Ferric Podzols.

COMMENTS: This is considered a seral variation of the CWHf1/05; black cottonwood would eventually give way to a spruce - (cedar) climax in the absence of periodic, severe flooding. However, recurrent flooding and erosion seem to maintain the seral stage.

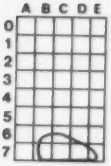
FLUVIAL SPRUCE - DEVIL'S CLUB - FERN (CWHf1/05)

ACTIVITY OR CONCERN	CWHf1/05 CWHf1/05(1)
Regeneration plans must be submitted and approved prior to road building and harvesting activity. Assess risk for next rotation in conjunction with erosion potential.	
Species choice:	
Preferred	- Sxs; component of Act for partial shading. - Cw and Ba may be preferred in areas where intensive brush control is not feasible or where spruce weevil hazard is severe. - Act may be preferred on some sites; establish by natural regeneration and manage as pure stands.
Acceptable	- Act, Cw, Hw, (Ba in cold air drainages).
Logging:	- log quickly and cleanly. - moving slash may damage plantation during floods. - consider cutting deciduous seed trees around opening.
Site preparation:	
Mechanical	- OK, if planting follows immediately; use jumbo stock. - aggravates brush problems. - cost/benefit assessment important.
Prescribed fire	- OK, but burning improbable using conventional means.
Brush hazard:	- severe; burning may control brush for 1 or 2 years. - search for appropriate herbicide.
Reforestation:	- secure supply of planting stock prior to harvesting. - PLANT IMMEDIATELY with the healthiest, sturdiest, tallest spruce stock available.
Other comments:	- check fisheries implications if burning attempted. - ASSESS ANNUALLY during high risk years (brush, flooding).

SKUNK CABBAGE (CWHf1/06)

SLOPE POSITIONS: Valley floor, base of slope, depressions in benches or terraces.

SLOPE RANGE: Level (0 - 2%).

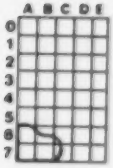


VEGETATION LAYERS	SOILS
TREE: trees widely spaced, mainly on hummocks. Sxs (usually dominant) Hw Cw Dr	PARTICLE SIZE CLASS: Loamy, fine-loamy (for mineral soils).
SHRUB: well developed. Cornus sericea Rubus spectabilis Viburnum edule (Oplopanax horridus) (Menziesia ferruginea) (Vaccinium spp.) (Spiraea douglasii) (Malus fusca)	DRAINAGE: Imperfect to very poor.
	EFFECTIVE ROOTING: Often 20 - 30 cm.
	COARSE FRAGMENT CONTENT: Usually 0.
	TERRAIN/PARENT MATERIALS: Organic overlying lacustrine, morainal or fluvial deposits.
HERB: usually well developed. Lysichiton americanum Athyrium filix-femina Dryopteris assimilis Equisetum arvense Gymnocarpium dryopteris (Cornus canadensis)	SOIL NAME: Terric Mesisols; Terric Humisols; (Orthic Humic Gleysols).
	HUMUS FORM: Histomoders.
MOSS: poorly developed except on hummocks. Mnium spp. Sphagnum spp. Rhytidiadelphus loreus	

COMMENTS: Forest capability in these ecosystems depends on ecological nutrient status and successional stage. Best stands are dominated by Sxs or Cw; nutrient-poor swamps occur in complex with Hw - Vaccinium - Moss ecosystems elevated above the water table (see CWHf1/01b).

SKUNK CABBAGE (CWHf1/06)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sxs, Cw.
Acceptable	- Ba, richer examples of this unit. - Hw, only on hummocks.
Logging:	- winter logging preferred. - do not disturb soil. - avoid drainage interference (roads, skid trails). - avoid levelling mounds or hummocks. - this unit will be very difficult to plant and survival will likely be low if not logged with some care.
Site preparation:	
Mechanical	- AVOID unless used to improve drainage.
Prescribed fire	- AVOID, burning will reduce plantable spots, eliminate advanced regeneration and natural seeding, and reduce organic horizons and the productive area accordingly.
Brush hazard:	- variable (assess during pre-logging assessment).
Reforestation:	- promote natural and advanced regeneration of all conifers. - if required, plant Sxs and Cw.
Other comments:	- mechanical site preparation may be used to create plantable mounds or remove slash or to improve drainage (Marttiini plough).



BOG ECOSYSTEMS (CWH/1/07)

SLOPE POSITIONS: Valley floor, slope bases, depressions in benches or terraces.

SLOPE RANGE: Usually level (0 - 10%).

VEGETATION LAYERS

TREE: scattered, shrub-size trees.
(Ha)
(Cw)
(Pl)
(Hm)

SHRUB: sparse to well developed.
Ledum groenlandicum
(Spiraea douglasii)
(Vaccinium uliginosum)

HERB: variable cover, includes many dwarf shrubs.
Kalmia microphylla
Andromeda polifolia
Vaccinium oxycoccus
Carex spp.
Drosera anglica
D. rotundifolia
Coptis trifolia
Trientalis europaea ssp. arctica
Platanthera dilitata
Menyanthes trifoliata
Potentilla palustris
Scheuchzeria palustris
Lycopodiella inundata

MOSS: continuous, hummocky mat of peat moss.
Sphagnum spp.
Aulacomnium palustre
Pleurozium schreberi
Hylocomium splendens

SOILS

PARTICLE SIZE CLASS:
N/A.

DRAINAGE:
Imperfect to very poor.

EFFECTIVE ROOTING:
Not well documented but generally shallow (less than 30 cm).

COARSE FRAGMENT CONTENT:
N/A.

TERRAIN/PARENT MATERIALS:
Organic blankets.

SOIL NAME:
Typic Mesisols;
(Terric Mesisols).

HUMUS FORM:
Mistomoders.

COMMENTS: Sparsely treed ecosystems with no commercial timber value.

4.4 Ecosystem Units of the CWHF1a (Dahl-Mendeerne) and Upper Kitimat River Phases

ACTIVITY OR CONCERN	MODIFICATIONS TO CWHF1 PRESCRIPTIONS
Species choice:	- no Pl. - less Cw. - less Ss. - more Ba.
Logging:	- road location and drainage structures take on greater importance.
Site preparation:	
Mechanical	- AVOID.
Prescribed fire	- AVOID.
Brush hazard:	- see equivalent units of CWHF1.
Reforestation:	- heavier reliance on naturals.
Other comments:	- the climate is transitional both to more oceanic CWH1 and to the higher elevation CWHF2.

TABLE 5. Equivalent ecosystem units of the CWHF1, CWHF1a, and CWHF2

Ecosystem Units of the CWHF1	Equivalent Ecosystem Units of the CWHF1a	Equivalent Ecosystem Units of the CWHF2
/01	/01	/01
/01(1)		/01(1)
/02	/02	/02
/03	/03	/03
/04	/04	/04
/05	/05	
/05(1)	/05(1)	

5 THE CWHf2 VARIANT

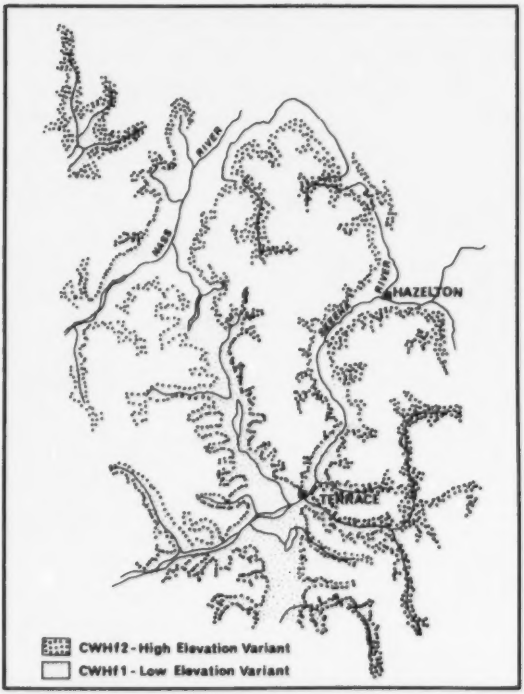


FIGURE 9. High Elevation Variant of the Coastal Western Hemlock Zone, Northern Drier Maritime Subzone (CWHf2).

Classification of Ecosystem Units of the CWHf2:
High Elevation Variant

CWHf2/01 Zonal Hemlock - (Amabilis Fir) - Vaccinium - Moss ecosystem association

/01(1) Amabilis Fir - Rhytidiopsis robusta variation

CWHf2/02 Dry Hemlock - Moss ecosystem association

CWHf2/03 Devil's Club - Oak Fern ecosystem association

CWHf2/04 Devil's Club - Lady Fern - Oak Fern ecosystem association

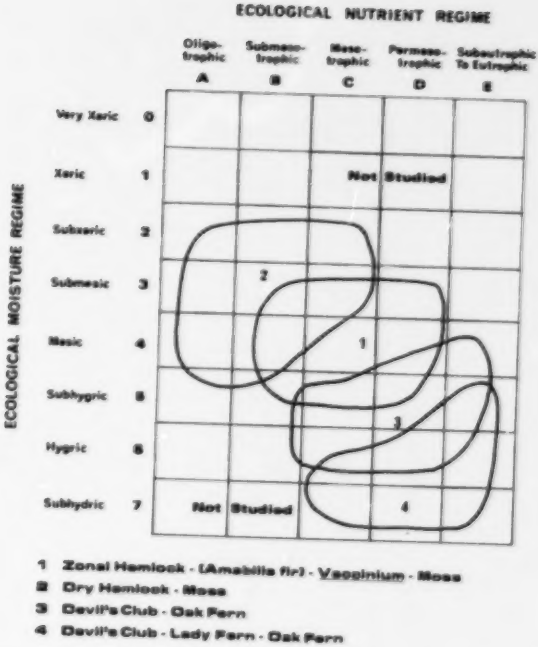


FIGURE 10. Edatopic grid of ecological moisture and nutrient regimes - CWH2.

5.1 Key to Ecosystem Units of the CWHF2

A. Ecosystems with good tree growth; Oplopanax horridus common in shrub layers; herb layer dominated by ferns . . . . B

AA. Ecosystems with moderate to poor tree growth; Oplopanax horridus rare or lacking in shrub layers; ferns rare or lacking in herb layer C

B. Athyrium filix-femina dominates the herb layer; feathermosses confined to hummocks and decaying wood

DEVIL'S CLUB - LADY FERN - OAK FERN (CWHF2/04)

BB. Athyrium filix-femina rare or lacking in the herb layer; moderately well-developed feathermoss carpet

DEVIL'S CLUB - OAK FERN (CWHF2/03)

C. Shrub layers moderately to well developed, dominated by Vaccinium spp.; dominantly mid-slope positions, extending to upper and lower slopes; mesic and mesotrophic moisture and nutrient conditions

ZONAL HEMLOCK - (AMABILIS FIR) - VACCINIUM - MOSS (CWHF2/01)

CC. Shrub layers very poorly developed . . . . . D

D. Moss layer dominated by Hylocomium splendens and Pleurozium schreberi; upper slopes, ridges, bedrock outcrops, benches (river terraces); submesic and submesotrophic moisture and nutrient conditions

DRY HEMLOCK - MOSS (CWHF2/02)

DD. Moss layer dominated by Rhytidiopsis robusta; dominantly mid-slope positions, extending to upper and lower slopes; mesic and mesotrophic moisture and nutrient conditions

ZONAL HEMLOCK - (AMABILIS FIR) - VACCINIUM - MOSS: AMABILIS FIR - RHYTIDIOPSIS ROBUSTA VARIATION [(CWHF2/01(1))]

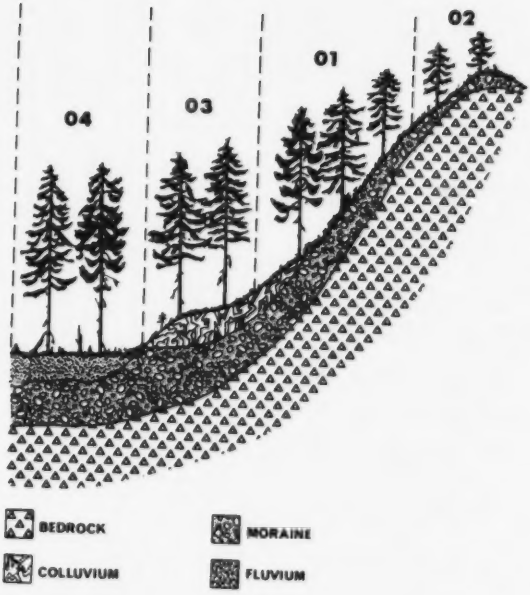


FIGURE 11. Topographic sequence of CWHf2 ecosystem associations.

5.2 Prominence of the Major Species of the CWHf2

Figure 12 depicts the relative prominence of several species that typify the CWHf2. Prominence is a measure derived from both presence and plant cover. For example if a species is present on four of five plots (i.e., presence of 80%) and has a mean cover on the five plots of 7%, its prominence would be equal to:

(square root of 80) x (7) = 63 (rounded off to nearest whole number)

Figure 12 only includes species having a prominence value of 30 or more in one or more ecosystems. To get a firm idea of this cut-off value, note that a species that always occurs would have to have a cover of 3% or more.

Figure 12 presents circles whose diameters are proportional to the prominence value. The diameter equivalent to a prominence value of 30 is about 1.1 mm.

5.3 Description and Interpretation of CWHf2 Ecosystems

Table 6 presents selected physical and edaphic features associated with the ecosystem units; Table 7 summarizes silvicultural interpretations for these units. The small figure that appears in the upper right of the descriptive page is an edatopic grid with an outlined area indicating the usual moisture and nutrient conditions for the ecosystem.

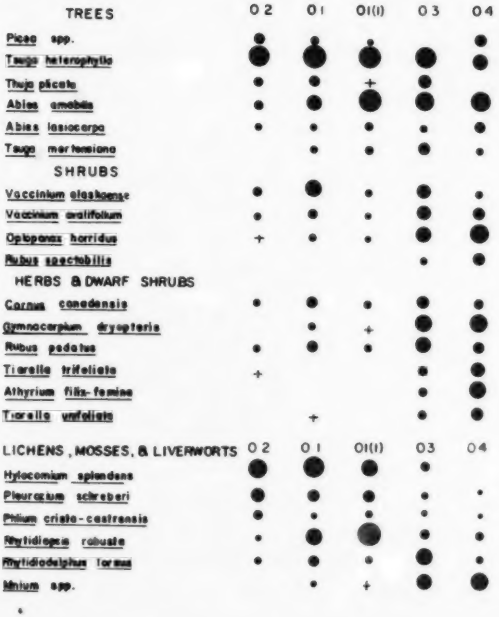


FIGURE 12. Prominence values for the major species of the CWH2.

TABLE 6. Habitat features of ecosystem associations of the Coastal Western Hemlock, Northern Drier Maritime, High Elevation Variant (CWHf2)

Habitat features	CWHf2/01	CWHf2/02	CWHf2/03	CWHf2/04
Slope positions	Middle, (benches)	Upper, ridges, benches, terraces	Middle to lower	Valley floor, lower slope or toe
Slope range	0-70+%	Level to extremely steep	Flat to very steep	0-25%
Soil parent materials[a]	C, M, FG, (F)	Mv, Cv, (F, FG)	FG, M, C	F, M, C
Particle size classes[b]	L, LS, CLS	CL, CLS	L, CLS	L
Drainage class[c]	G - MG	R - G	MG - I	MG - P
Moisture regime	mesic	submesic	subhygric	hygric
Nutrient regime[d]	m	sm	pm	pm
Soil classification[e]	FHP, HFP	HFP	FHP, GL	EB, HG, FHP
Humus form classification[f]	MMR, HUMR	MMR	HUMR, MMR	HUMR, MMR
Rooting depth (cm)	20-40	< 50	20-70	< 60
Thickness, mineral soil (cm)	20-70	50	30-40	60 (?)
Thickness, humus layer (cm)	3-13	8-15	6-40	12-28
Mineral soil pH (mean in $CaCl_2$)	4.7	4.4	5.0	5.9
Humus pH (mean in $CaCl_2$)	3.2	3.0	4.3	5.7

[a]C = colluvial, F = fluvial, FG = glaciofluvial, L = lacustrine, M = morainal, O = organic, v = veneer (less than 1 m thick), b = blanket (greater than 1 m thick); e.g., Cv = colluvial veneer.
[b]Family particle size classes from CSSC (1978). S = sandy, L = loamy, CL = coarse-loamy, FL = fine-loamy, SS = sandy-skeletal, LS = loamy-skeletal, CLS = coarse loamy-skeletal.
[c]Drainage class from Walmsley et al. (1980). VR = very rapid, R = rapid, G = good, MG = moderately good, I = imperfect, P = poor, VP = very poor.
[d]Nutrient Regime: most common regime(s), from Haeussler et al. (1984). m = mesotrophic, sm = submesotrophic, pm = permesotrophic, e = eutrophic.
[e]Representative Soil Great Groups (CSSC 1978). EB = Eutric Brunisol, HG = Humic Gleysol, GL = Gray Luvisol, FHP = Ferro-Humic Podzol, HFP = Humo-Ferric Podzol.
[f]Representative Humus Form Group (Klinka et al. 1981). MMR = Mesimor, HUMR = Humimor, MMR = Mormoder, HTMR = Histomoder.
Note: For abbreviations of ecosystem units, see previous lists accompanying edatopic grids.

TABLE 7. Summary of silvicultural prescriptions and guidelines for the CWHf2

Ecosystem unit	Species choice[a] Preferred	Acceptable	Primary method of establishment[b]	Site preparation[c] Mech.	Burning	Brush potential
Zonal Hw - (Ba) Vaccinium - Moss	Hw, Ba, Sxs	(Cw, Hm Bl, Pl)	natural and planting	AVOID	AVOID	low
Dry Hw - Moss	Pl, Hw	(Hm, Cw)	natural and planting	AVOID	AVOID	none
Devil's Club - Oak Fern	Sxs	Ba, (Hw, Cw, Bl)	planting	AVOID	OK	moderate
Devil's Club - Lady Fern - Oak Fern	Sxs	Ba, (Hw, Cw, Bl)	planting	AVOID	OK	severe

[a]Generally speaking, Ba is more important and Cw is much less important in the CWHf2 compared to the f1. Provenance of Sx is also more critical in the high elevation variant.

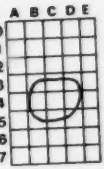
[b]There tends to be a heavier reliance on natural regeneration in the CWHf2 compared to the f1.

[c]Site preparation should be practised much less and with more care in the CWHf2 than in the f1; the climate is more severe and limiting, and organic soil horizons are much more important ecologically in the CWHf2.

ZONAL HEMLOCK - (AMABILIS FIR) - VACCINIUM - MOSS (CWHf2/01)

SLOPE POSITIONS: Valley floor, slope bases,and terraces.

SLOPE RANGE: Level.



VEGETATION LAYERS

TREE:
Hw
Ba

SHRUB: usually moderately to well developed; advanced regeneration usually abundant.
Vaccinium alaskaense
Menziesia ferruginea
Vaccinium ovalifolium
Vaccinium membranaceum

HERB: poorly to moderately well developed.
Rubus pedatus
Cornus canadensis
Orthilia secunda

MOSS: well developed.
Hylocomium splendens
Rhytidiopsis robusta
Rhytidiadelphus loreus
Pleurozium schreberi

SOILS

PARTICLE SIZE CLASS:
Loamy, loamy-skeletal, coarse loamy-skeletal.

DRAINAGE:
Good to moderately good.

EFFECTIVE ROOTING:
Generally 20 - 40 cm.

COARSE FRAGMENT CONTENT:
Generally greater than 25%.

TERRAIN/PARENT MATERIALS:
Colluvial, morainal, and sometimes glaciofluvial (rarely fluvial).

SOIL NAME:
Orthic Humo-Ferric Podzols;(Ortstein Humo-Ferric Podzols; Ferro-Humic Podzols; Fera Gleysols).

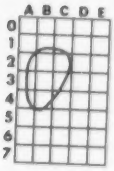
HUMUS FORM:
Hemimors; Hemihumimors.

COMMENTS: The Amabilis fir - Rhytidiopsis robusta variation CWHf2/01(1) occurs at elevations greater than 700 m where snowpack is heavy. Amabilis fir regeneration, Menziesia ferruginea, Streptopus streptopoides, and Rhytidiopsis robusta are all more abundant than they are in typical CWHf2/01.

DRY HEMLOCK - MOSS (CHwf2/02)

SLOPE POSITIONS: Upper (also ridges, benches, and river terraces).

SLOPE RANGE: Level to extremely steep.



VEGETATION LAYERS

TREE:
Hw
(Ba)
(Bl)

SHRUB: very poorly developed.
(Vaccinium alaskaense)
(V. ovalifolium)
(Menziesia ferruginea)

HERB: very poorly developed.
(Orthilia secunda)
(Rubus pedatus)
(Cornus canadensis)

MOSS: usually well developed.
Hylocomium splendens
Pleurozium schreberi
Rhytidiopsis robusta

SOILS

PARTICLE SIZE CLASS:
Coarse-loamy, coarse loamy-skeletal.

DRAINAGE:
Rapid to good.

EFFECTIVE ROOTING:
Often restricted by bedrock at less than 50 cm.

COARSE FRAGMENT CONTENT:
Usually less than 35%.

TERRAIN/PARENT MATERIALS:
Morainal (sometimes colluvial) veneers. Rarely fluvial or glaciofluvial materials.

SOIL NAME:
Orthic Humo-Ferric Podzols.

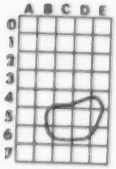
HUMUS FORM:
Hemimors.

COMMENTS: The association is limited in extent and distribution compared to the analagous association in the CWHf1. Mineral soils are usually shallow (less than 50 cm) to bedrock; surface organic layers are often greater than 10 cm.

DEVIL'S CLUB - OAK FERN (CWHF2/03)

SLOPE POSITIONS: Middle to lower.

SLOPE RANGE: Flat to very steep (usually gentle).



VEGETATION LAYERS

TREE:
Hw
Ba
(Bl)
(Sxs)

SHRUB: moderately to well developed.
Oplopanax horridus
Vaccinium ovalifolium
V. alaskaense
Menziesia ferruginea
Ribes lacustre
Rubus spectabilis

HERB: moderately to well developed.
Gymnocarpium dryopteris
Tiarella unifoliata
T. trifoliata
Streptopus streptopoides
S. roseus
S. amplexifolius
Rubus pedatus

MOSS: usually well developed.
Rhytidiopsis robusta
Rhytidiadelphus loreus
Hylocomium splendens
Pleurozium schreberi
Mnium spp.

SOILS

PARTICLE SIZE CLASS:
Loamy, (coarse loamy-skeletal).

DRAINAGE:
Moderately good to imperfect.

EFFECTIVE ROOTING:
20 - 70 cm.

COARSE FRAGMENT CONTENT:
Usually low (may range from 10 - 45%).

TERRAIN/PARENT MATERIALS:
Glaciofluvial, washed morainal or washed colluvial materials.

SOIL NAME:
Ferro-Humic Podzols;
Brunisolic Gray Luvisols.

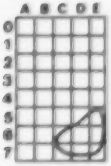
HUMUS FORM:
Mormoders; Hemihumimors.

COMMENTS: A productive association for Hw, Ba, and Sxw. Oplopanax horridus is always present but rarely dominates the shrub layer. Gymnocarpium dryopteris is a characteristic dominant herb. Wetter microsites may contain indicator species from the CWHF2/04.

DEVIL'S CLUB - LADY FERN - OAK FERN (CWH?2/04)

SLOPE POSITIONS: Valley floor, lower slope, and toe.

SLOPE RANGE: Level to moderately sloping (0 - 25%).



VEGETATION LAYERS

TREE:
Hw
Ba
Bl
(Sxs)

SHRUB: well developed.
Oplopanax horridus
Rubus spectabilis
Ribes lacustre
Vaccinium spp.
Rubus parviflorus
Sambucus racemosa

HERB: well developed.
Athyrium filix-femina
Gymnocarpium dryopteris
Tiarella trifoliata
T. unifoliata
Viola glabella
Streptopus streptopoides
S. roseus
S. amplexifolius
(Equisetum arvense)
(Galium triflorum)
(Dryopteris assimilis)
(Veratrum viride)
(Valeriana sitchensis)

MOSS: usually poorly developed.
Mnium spp.
(Brachythecium spp.)
(Rhytidiopsis robusta)

SOILS

PARTICLE SIZE CLASS:
Loamy.

DRAINAGE:
Moderately good to poor.

EFFECTIVE ROOTING:
Probably less than 40 cm.

COARSE FRAGMENT CONTENT:
Usually less than 25%.

TERRAIN/PARENT MATERIALS:
Fluvial or washed morainal and washed colluvial materials.

SOIL NAME:
Orthic Eutric Brunisols;
Orthic Humic Gleysols;
Gleyed Ferro-Humic Podzols.

HUMUS FORM:
Hydrmors, Hydrmoders.

COMMENTS: Bl is more abundant in areas experiencing cold air drainage; Sxs is the largest tree (when present). Oplopanax horridus is a characteristic dominant shrub. Herb layer has diverse species composition but is visually dominated by Athyrium filix-femina. Veratrum viride and Valeriana sitchensis occur at upper elevations only.

6 LITERATURE CITED

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APPENDIX 1. Tree species symbols

Latin name	Common name	Symbol
Abies amabilis	amabilis fir	Ba
Abies lasiocarpa	subalpine fir	Bl
Alnus rubra	red alder	Dr
Betula papyrifera	paper birch	Ep
Picea (unknown origin)	hybrid spruce	Sx
Picea glauca x engelmannii	---	Sxw
Picea glauca x sitchensis	Roche spruce	Sxs
Picea mariana	black spruce	Sb
Picea sitchensis	Sitka spruce	Ss
Pinus contorta var. latifolia	lodgepole pine	Pl
Populus balsamifera ssp. trichocarpa	black cottonwood	Act
Populus tremuloides	trembling aspen	At
Thuja plicata	western redcedar	Cw
Tsuga heterophylla	western hemlock	Hw
Tsuga mertensiana	mountain hemlock	Hm

APPENDIX 2. List of plant names used in the guide

TREES:

Abies amabilis	amabilis fir
Abies lasiocarpa	subalpine fir
Alnus rubra	red alder
Betula papyrifera	paper birch
Chamaecyparis nootkatensis	yellow-cedar
Juniperus scopulorum	Rocky Mountain juniper
Picea engelmannii	Engelmann spruce
Picea glauca	white spruce
Picea mariana	black spruce
Picea sitchensis	Sitka spruce
Picea sitchensis x glauca	Roche spruce
Pinus contorta var. contorta	shore pine
Pinus contorta var. latifolia	lodgepole pine
Populus balsamifera ssp. trichocarpa	black cottonwood
Populus tremuloides	trembling aspen
Taxus brevifolia	western yew
Thuja plicata	western redcedar
Tsuga heterophylla	western hemlock
Tsuga mertensiana	mountain hemlock

SHRUBS:

Amelanchier alnifolia	Saskatoon
Cornus sericea	red-osier dogwood
Corylus cornuta	hazelnut
Gaultheria shallon	salal
Kalmia microphylla	bog-laurel
Ledum groenlandicum	Labrador tea
Lonicera involucrata	black twinberry
Malus fusca	Pacific crab apple
Menziesia ferruginea	false azalea
Oplopanax horridus	devil's club
Paxistima myrsinites	falsebox
Ribes spp.	currants and gooseberries
Ribes bracteosum	stink currant
Ribes lacustre	black gooseberry
Rosa acicularis	prickly rose
Rosa nutkana	Nootka rose
Rubus parviflorus	thimbleberry
Rubus spectabilis	salmonberry
Sambucus racemosa	red elderberry
Shepherdia canadensis	soopolallie
Spiraea douglasii	hardhack
Symphoricarpos albus	common snowberry
Vaccinium alaskaense	Alaskan blueberry
Vaccinium membranaceum	black huckleberry
Vaccinium ovalifolium	oval-leaved blueberry
Vaccinium parvifolium	red huckleberry
Vaccinium uliginosum	bog blueberry
Viburnum edule	highbush-cranberry

APPENDIX 2. (Continued)

HERBS AND DWARF SHRUBS:

Actaea rubra	baneberry
Adiantum pedatum	maidenhair fern
Andromeda polifolia	bog rosemary
Aralia nudicaulis	wild sarsaparilla
Arctostaphylos uva-ursi	kinnikinnick
Aruncus dioicus	goat's-beard
Asarum caudatum	wild ginger
Athyrium filix-femina	lady fern
Blechnum spicant	deer fern
Carex spp.	sedges
Cassiope mertensiana	white mountain-heather
Chimaphila umbellata	prince's pine
Circaea alpina	enchanter's nightshade
Clintonia uniflora	queen's cup
Coptis asplenifolia	fern-leaved goldthread
Coptis trifolia	three-leaved goldthread
Corallorhiza maculata	spotted coralroot
Cornus canadensis	bunchberry
Disporum hookeri	Hooker's fairybells
Drosera anglica	long-leaved sundew
Drosera rotundifolia	round-leaved sundew
Dryopteris assimilis	spiny wood fern
Epilobium angustifolium	fireweed
Equisetum spp.	horsetails
Equisetum arvense	common horsetail
Equisetum hyemale	scouring-rush
Equisetum pratense	meadow horsetail
Galium triflorum	sweet-scented bedstraw
Goodyera oblongifolia	rattlesnake-plantain
Gymnocarpium dryopteris	oak fern
Hemitomes congestum	gnome-plant
Lathyrus nevadensis	purple peavine
Linnaea borealis	twinflower
Listera cordata	heart-leaved twayblade
Luetkea pectinata	partridgefoot
Lycopodiella inundata	bog clubmoss
Lysichiton americanum	skunk cabbage
Maianthemum dilatatum	false lily-of-the-valley
Melampyrum lineare	cow-wheat
Menyanthes trifoliata	buckbean
Mitella nuda	common mitrewort
Moneses uniflora	single delight
Orthilia secunda	one-sided wintergreen
Oryzopsis asperifolia	rough-leaved ricegrass
Oryzopsis pungens	short-awned ricegrass
Osmorhiza chilensis	mountain sweet-cicely
Phyllodoce empetriformis	pink mountain-heather
Platanthera dilatata	white bog-orchid
Platanthera orbiculata	round-leaved rein-orchid

APPENDIX 2. (Continued)

Polystichum munitum	sword fern
Potentilla palustris	marsh cinquefoil
Pyrola asarifolia	pink wintergreen
Rubus pedatus	five-leaved bramble
Rubus pubescens	trailing raspberry
Sanguisorba canadensis	Sitka burnet
Scheuchzeria palustris	scheuchzeria
Smilacina racemosa	false Solomon's-seal
Streptopus amplexifolius	clasping twistedstalk
Streptopus roseus	rosy twistedstalk
Streptopus streptopoides	small twistedstalk
Thelypteris phegopteris	beech fern
Tiarella trifoliata	three-leaved foamflower
Tiarella unifoliata	one-leaved foamflower
Trientalis europaea spp. arctica	northern starflower
Vaccinium caespitosum	dwarf blueberry
Vaccinium oxycoccos	bog cranberry
Valeriana sitchensis	Sitka valerian
Veratrum viride	Indian hellebore
Viola spp.	violets
Viola canadensis	Canada violet
Viola glabella	stream violet

LICHENS, MOSSES, AND LIVERWORTS:

Aulacomnium palustre	glow moss
Barbilophozia spp.	leafy liverworts
Bazzania trilobata	liverwort
Brachythecium spp.	mosses
Cladina spp.	reindeer lichens
Cladonia spp.	lichens
Dicranum spp.	mosses
Dicranum polysetum	wavy-leaved moss
Hylocomium splendens	step moss
Isothecium spiculiferum	variable moss
Mnium spp.	leafy moss
Peltigera spp.	lichens
Plagiochila porelloides	liverwort
Plagiothecium undulatum	flat moss
Pleurozium schreberi	red-stemmed feather moss
Polytrichum juniperinum	juniper haircap moss
Ptilium crista-castrensis	knight's plume
Rhytidiadelphus loreus	little shaggy moss
Rhytidiopsis robusta	pipecleaner moss
Scapania bolanderi	liverwort
Sphagnum spp.	sphagnum
Sphagnum girgensohnii	common green sphagnum
Stereocaulon spp.	lichens
Stokesiella oregana	Oregon beaked moss